IX. GCF Development

DEVELOPMENT AND IMPLEMENTATION

A. GCF Wideband Digital Data System, *J. P. McClure*

In the fall of 1970, the GCF will install a 50-kbits/s wideband digital data capability between the SFOF, DSS 14, and CTA 21. These capabilities will first be used in support of the *Mariner* Mars 1971 mission.

Figure 1 delineates the major functional components used in this new GCF system. CTA 21 and DSS 14 will each be connected to the SFOF by a full duplex synchronous transmission capability which will permit 50-kbits/s data to be interchanged simultaneously in both directions between the SFOF and either field location.

In the inbound (station-to-SFOF) direction, data from two or more station telemetry and command processor computers will be merged, on a data block basis, by a block multiplexer. The merged data, plus any filler blocks necessary for synchronous operation, will be output by the block multiplexer at a 50-kbits/s rate to the error detection encoder. This encoder will append an error detection code to the end of each block before it is transmitted by the data set. The data set translates the digital signal to an audio form appropriate for transmission over 48-kHz microwave or cable facilities. In the Goldstone case, a regenerator at the DSCC area communications terminal will retime and clean up the signal prior to forwarding it toward the SFOF. In the SFOF, the signal will be received and demodulated to digital form by the data set. The error detection decoder will detect the presence of any transmission errors and will output the data to line drive amplifiers for the SFOF central processing system and the *Mariner* Mars 1971 mission test computer.

In the opposite direction, the SFOF wideband transmit terminal will accept blocked simulation data from the Simulation Center 6050 computer, process it to audio form, and route it to a patching capability in the basement of the SFOF. This signal can then be routed either to CTA 21 or DSS 14. The outbound path (SFOF-to-station) includes a demultiplexer at each field location. These devices will remove the filler blocks inserted by the block multiplexer.

Transmission between DSS 14 and the Goldstone DSCC Communications Center will be made via the existing Goldstone area microwave link. The signals will be relayed between the DSCC and the SFOF over modified channels of the Goldstone–SFOF microwave link provided by Western Union. Communications between CTA 21 and the SFOF will use existing shielded cables capable of 50-kbits/s operation.

The system is expected to yield an error rate of 3×10^{-5} or better on a 24-h basis. In the inbound direction, erroneous blocks sensed by the decoder will be tallied by an

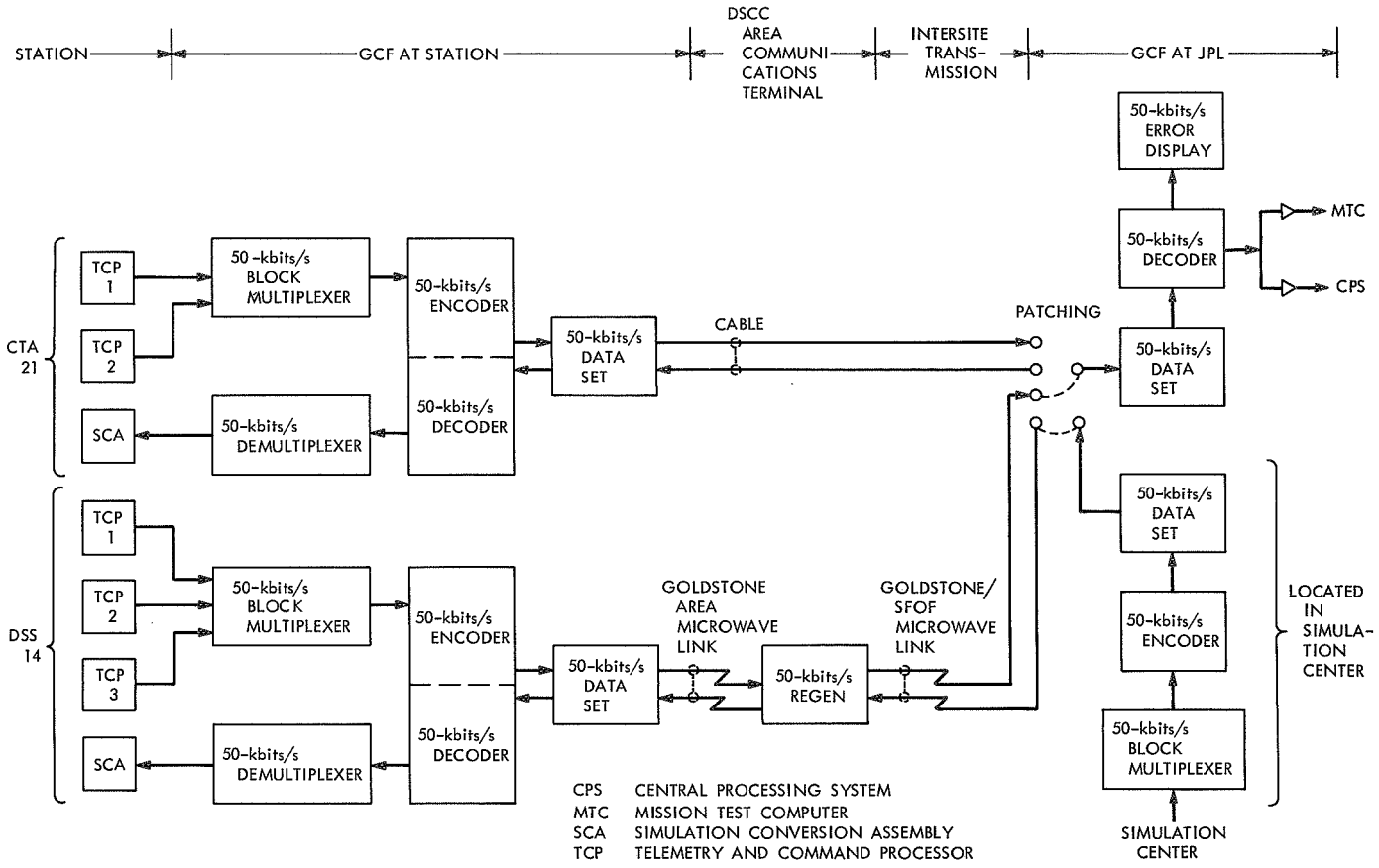

Fig. 1. Ground Communications Facility 1971–1972 wideband system

error display, thus permitting real-time quality evaluation. In the operationally critical DSS 14-to-SFOF link, dual terminal equipments and transmission links will be used to provide high service availability.

Inbound data (to the SFOF) will initially consist of one or two *Mariner* Mars 1971 digital video streams of 16 kbits/s or less each. Each stream will be output from an active telemetry and command processor. In the opposite direction, the Simulation Center will send simulated video data outbound to the station simulation conversion assembly where the blocked data will be transformed into spacecraft rate information and used as simulated data inputs at several locations within the station.